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ABSTRACT

In order to appropriately interpret norm referenced measures, we need to know the characteristics of persons in the standardization sample. Mercer (1977) states that evidence from three sources should be examined when deciding if pluralistic norms are needed. First, do racial-ethnic groups differ on important social, economic, and cultural characteristics? Second, do they also differ in their test performce? And, third, do these socio-cultural characteristics correlate with test performance? Affirmative answers to these questions would suggest the need for pluralistic norms. The Estimated Learning Potential (ELP) is a statistical device which, if its validity is established, may help make equitable comparisons among children of different ethnic groups. (Author)

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Pluralistic Norms and Estimated Learning Potential[1]

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In order to appropriately interpret norm referenced measures we need to know the characteristics of persons in the standardization sample. Moreover, this information is used in interpreting scores. When using norms we assume the children we test and those in the standardization sample are similar in terms of relevant characteristics, including their having had similar opportunities and encouragement to learn and develop, are equally test wise, and are free of emotional and physical disorders which interfere with test performance (Mercer, 1977; Newland, 1973).

How can we tell if a norm group is appropriate? At least three options exist. First, we can use a large, heterogeneous sample of children stratified on the basis of such variables as age, sex, geography, SES, and racial-ethnic membership. Second, we can standardize a test on a very narrow norm group--for example, peers of the same age, sex, and ethnicity. Or, third, we can standardize a test on a large and heterogeneous sample and then develop individual or pluralistic norms which enable us to compare people with their own specific peer group.

Mercer (1977) states that evidence from three sources should be examined when deciding if pluralistic norms are needed. First, do racial-ethnic groups differ on important social, economic, and cultural characteristics? Second, do they also differ in their test performance? And, third, do these sociocultural characteristics correlate with test performance? Affirmative answers to these questions would suggest the need for pluralistic norms. This paper addresses these three questions and then reviews data on the Estimated Learning Potential.

METHOD

The sample consists of 467 children between the ages of 6 and 14. A stratified random sampling design was employed to select children from grades 1 through 8 from the three racial-ethnic groups (Anglo, Black, Mexican American) from two social classes and from both sexes.

The data reported in this paper come from a larger study in which data were obtained on children's prior and current medical, social, psychological, and educational characteristics. Many instruments were administered to children to directly assess these characteristics; in addition, each child's mother was interviewed for similar kinds of information.

The data reported herein come from three major instruments: the Wechsler Intelligence Scale for Children (WISC-R), the reading and math test from the California Achievement Series, and two sections from the System of Multicultural Pluralistic Assessment (SOMPA). From the SOMPA come the sociocultural modalities scales which measure the social and cultural characteristics of the child's family background through four modalities: family size, family structure, socioeconomic status,

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and urban acculturation. These four modalities are used as the basis for establishing pluralistic norms for the WISC-R. The SOMPA's Adaptive Behavior Inventory for Children also was administered through mother interviews to acquire information on children's adaptive behavior. The ABIC assesses children's roles with respect to family, peers, community, school, as earners and consumers, and their self maintenance.

The actual number of children on whom data are reported today varies between 458 and 342. Their ethnic breakdown is provided in Tables 1 and 2.

Results and Discussion

Opportunities, encouragement, and rewards for children to learn often differ depending upon the family's sociocultural characteristics. If our groups differ in terms of sociocultural characteristics, then the use of pluralistic norms may be appropriate.

Do racial-ethnic groups differ on sociocultural characteristics? They do (Table 1) as measured by the four sociocultural modalities from the SOMPA. Mexican American and Black families tend to be larger than Anglo families. Also, within Mexican American families there is a greater tendency for the mother to be biologically related to the child and to be married and living with her spouse who is head of the household. The occupations of Anglos tend to be higher. Racial-ethnic differences exist on the Urban Acculturation scale, too. Higher scores on this scale reflect in the parents a higher degree of internal control, greater participation in community affairs, more formal education, their speaking English, and their having been raised in a large city. On Urban Acculturation, Anglos are higher than Blacks who in turn are higher than Mexican Americans. Thus, our three racial-ethnic groups differ in significant ways on all four sociocultural scales.

Let us examine a second set of evidence to see if racial-ethnic differences exist on the WISC-R. If we find, for example, that the scores of Anglos, Blacks, and Mexican Americans differ on the WISC-R or other measures, the use of pluralistic norms may be appropriate.

Are there racial-ethnic differences on the WISC-R? Yes, on all three scales (Table 1). Anglos are highest, then Mexican Americans, and then Blacks (except on the Verbal subscale where Mexican Americans and Blacks do not differ significantly). The Austin data are in close agreement with the California data.

Given the fact that the three racial-ethnic groups differ on sociocultural scales and the WISC-R, is there evidence that the characteristics measured by the sociocultural scales covary with those measured by the WISC-R? Let us turn to that data.

All multiple correlations are significant, ranging from .34 to .63 (Table 2). The multiple correlations tend to be highest for Anglos and lowest for Blacks. Let us restrict our focus to data on the Full Scale and its intercorrelations with the sociocultural scales. The signs for all correlations within each scale are consistent across Austin's three racial-ethnic groups. Also within the three groups, Urban Acculturation and Socioeconomic Status correlate highest with Full Scale; Family Size correlations are significant, lower than those for Urban Acculturation and SES, and are negatively related to IQ. Family Structure correlations are lowest and relatively unimportant.

Thus, using the criteria set forth by Mercer (1977), there is evidence that pluralistic norms may be needed in order to correctly interpret the WISC-R data. This position is based on significant racial-ethnic differences found on the sociocultural scales and the WISC-R, and evidence of significant intercorrelations between the two scales.

Let me briefly review what pluralistic norms are and how actual IQs are adjusted within a pluralistic model. An actual IQ first is changed into an estimated IQ which is "the average score predicted for persons having a particular combination of sociocultural characteristics. In other words the estimated [IQ] score can be interpreted as the average score of persons from a particular sociocultural background, the norm for that group. The standard error for each equation indicates the amount of variation which would be expected about the norm" (Mercer, 1977, p. 17-10). The number of norms available for one test equals the number of possible combinations of sociological scores--thus, the term pluralistic. A child's performance is compared only with others from the same sociocultural background. All estimated IQs are transformed into standard scores having a mean of 100 and a standard deviation of 15; these scores are referred to as the Estimated Learning Potential (ELP).[1]

The use of separate multiple regression equations for Anglos, Blacks, and Mexican Americans presumably enables us to equalize the children's backgrounds and to make more equitable comparisons.

In the remaining time I would like to address the following questions associated with the ELP: Can the data from Mercer's California study be used to derive estimates of learning potential for children outside of California or will each community or state need to establish its own factor loadings? Also, can we begin to determine the validity of using the ELP?

Multiple regression equations developed for each of the three racial-ethnic groups using data from the four sociocultural scales are reported in Table 3. In comparing the data from Austin and California in Table 3 one notes general similarities in the weights and the standard errors of estimate. However, the Austin and California equations often use constants which differ by four or more points.

Do we find significant differences in the estimated learning potentials if we use the weights from the SOMPA as opposed to those developed from our own data? Six children were selected from our sample, 2 from each racial-ethnic group; of these 2, one had a high IQ and one had a low IQ. Two ELPs were calculated for each child, one using the SOMPA weights and one using weights developed from the Austin data (Table 4). The ELP derived from the two different equations are very similar for the low IQ Anglo, high IQ Black, and the two Mexican American children. The ELPs for the high IQ Anglo differ by 8 points and those for low IQ Black by 7 points.

[1] $ELP = (\text{actual IQ} - \text{estimated IQ} / SE_{est})\ (15) + 100$

Estimated IQ is determined by summing the weighted sociocultural modality scores (i.e., family size, family structure, SES, and urban acculturation) and a constant.

Parenthetically, it should be noted that the ELP is intended to be more useful with the lower IQ child from homes having lower sociocultural scores. Thus, in practice, estimated learning potentials generally will not be computed for high IQ, high SES children.

Ascertaining the validity of the ELP will require numerous studies conducted by people who use data in different ways; thus, studies will employ various criteria. As a school psychologist, one of my interests is in determining how the ELPs reflect a group's school achievement characteristics. This hopefully is in keeping with Mercer's (1977) position that the child who learns most probably has the most potential (p. 17-18). Do the characteristics represented by the ELP correspond to children's achievement in reading and math? How do these relationships compare with those between actual IQ and achievement? What is the relationship between ELP and achievement for children who have lower ELPs? Data pertaining to these issues are presented in Table 5.

The correlations between the full range of ELP and achievement are all significant as are those between actual IQ and achievement. The magnitude of the correlations between ELP and reading and ELP and math are similar. The median ELP correlation is in the high 40s while the median actual IQ correlation is .64. The ELP-achievement correlations are smaller than those for the actual IQ-achievement. The biggest differences are noted for Anglos (i.e., the 29 point difference between ELP and actual IQ on reading) and for middle SES children.

Recognizing that ELPs probably will be used more frequently with low IQ children, the relationships between ELPs below 100 and achievement were determined. These correlations are very low and are statistically significant only for Blacks and low SES children.

To summarize, significant racial-ethnic differences exist on the four sociocultural scales and the WISC-R. Three of the four sociocultural scales correlate moderately with the Full Scale WISC-R; multiple correlations account for 36% of the variance for Anglos, 28% for Mexican Americans, and 18% for Blacks. The weights for the multiple regression equations for Austin and California are similar but not identical. While preference should be given to using locally developed weights whenever possible, the weights provided in the SOMPA seem to provide somewhat accurate IQ estimates. Given the task of predicting a child's school achievement from either the ELP or his actual IQ, the use of the actual IQ would be more accurate, particularly for middle class and Anglo children.

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TABLE 1

Means and Analysis of Variance of Sociocultural and WISC-R Data for Children from Three Racial-Ethnic Groups From Austin and California[1]

	Anglo M	Black M	Mex-Am M	F	P	
Sociocultural Scale						
Family size						
Austin	6.9	8.2	8.5	10	<.001	MA=B > A
California	6.8	7.8	9.2	76	<.01	MA > B > A
Family Structure						
Austin	13.5	12.8	15.6	10	<.001	MA > A=B
California	15.2	12.2	15.4	63	<.01	MA=A > B
SES						
Austin	7.9	6.4	6.2	16	<.001	A > B=MA
California	8.1	4.8	5.1	230	<.01	A > MA > B
Urban Acculturation						
Austin	57	54	42	47	<.001	A > B > MA
California	66	53	40	433	<.001	A > B > MA
WISC-R						
Verbal						
Austin	103	92	92	29	<.001	A > B=MA
California	102	89	88	170	<.01	A > B=MA
Performance						
Austin	106	93	98	30	<.001	A > MA > B
California	104	90	98	137	<.01	A > MA > B
Full Scale						
Austin	104	92	95	35	<.001	A > MA > B
California	103	88	92	179	<.01	A > MA > B
N						
Austin	186	142	130			
California	604	456	520			

[1]The California data in this and other tables were taken from Mercer, J. System of Multicultural Pluralistic Assessment Conceptual and Technical Manual. Riverside, CA: University of California, Riverside, 1977.

TABLE 2

Correlations Between the Sociocultural Scales and the WISC-R for Children from Austin and California

	Sociocultural Scales				
	Family Size r	Family Structure r	SES r	Urban Acculturation r	R
Anglo					
Full Scale					
Austin (N=136)	-24*	12	51*	50*	6[illegible]***
California	-11**	15***	39***	29***	42***
Verbal					
Austin	-27*	14	51*	54*	63***
California	11**	16***	40***	32***	45***
Performance					
Austin	-15	06	38*	32*	40***
California	08*	10***	28***	17***	30***
Black					
Full Scale					
Austin (N=116)	-25*	06	31*	36*	42***
California	-20***	13**	25***	30***	37***
Verbal					
Austin	-29	01	30*	35*	43***
California	-19***	11**	20***	26***	32***
Performance					
Austin	-15	10	27*	31*	34**
California	-16***	12**	24***	27***	34***
Mexican-American					
Full Scale					
Austin (N=90)	-32*	14	44*	42*	53***
California	-19***	-03	16***	37***	39***
Verbal					
Austin	-36*	11	47*	45*	58***
California	-23***	-05	14**	45***	47***
Performance					
Austin	-19	14	32*	28*	36*
California	-09***	01	13**	16***	19***

*p < .05
**p < .01
***p < .001

TABLE 3

Data from Austin and California for use in Multiple Regression Equations for Estimating Learning Potential[1] from Sociocultural Scale and WISC-R Scores

	Weights					
	Family Size	SES	Family Structure	Urban Accult'n	SE_{est}	Constant
Full Scale IQ						
Anglo						
Austin	-.85	1.5	.23	.36	12	76
California	-.42	1.5	.32	.14	13	80
Black						
Austin	-.65	.67	.28	.23	12	81
California	-.46	.49	.22	.19	12	77
Mexican-American						
Austin	-.83	1.4	-.17	.17	12	86
California	-.29	.42	.00	.20	12	85
Verbal Scale IQ						
Anglo						
Austin	.1	1.3	.35	.45	13	70
California	-.42	1.6	.37	.19	13	74
Black						
Austin	-.81	.70	-.11	.21	12	85
California	-.54	.38	.24	.17	13	79
Mexican-American						
Austin	-.98	1.6	-.14	.20	12	84
California	-.38	.27	.00	.30	13	79
Performance Scale IQ						
Anglo						
Austin	-.41	1.3	.57	.17	13	88
California	-.36	1.2	.23	.05	13	90
Black						
Austin	-.37	.6	-.09	.22	13	81
California	-.33	.58	.18	.17	12	78
Mexican American						
Austin	-.48	1.1	.10	-.08	13	91
California	-.16	.47	.00	.08	13	94

[1] $ELP=(\text{Actual IQ}-\text{Estimated IQ}/SE_{est})\ (15) + 100$

Estimated IQ is determined by taking a child's scores from the four modalities (i.e., family size, socioeconomic status, family structure, and urban acculturation) times their respective weights and adding these values to the constant.

TABLE 4

Estimated Learning Potentials[1] For Six Children Using Weights From The Sompa Manual vs. Those Developed from the Austin Data Base

		Estimated Learning Potential SOMPA	(Austin)
Anglo			
high IQ	(114-101/12.8) (15) + 100 =	115	107
low IQ	(85- 94/12.8) (15) + 100 =	89	88
Black			
high IQ	(115- 94/11.65) (15) + 100=	127 vs	123
low IQ	(85- 92/11.65) (15) + 100=	91 vs	84
Mexican American			
high IQ	(117-110/12.34) (15) + 100=	120 vs	117
low IQ	(84- 90/12.34) (15) + 100=	93 vs	95

[1] Estimated Learning Potential = (actual IQ-estimated IQ/SE_{est}) (15) + 100

TABLE 5

Correlations Of Estimated Learning Potential

And Actual Intelligence with Achievement

	Actual Intelligence	Estimated Learning Potential for full range of ELPs	Estimated Learning Potential for ELPs < 100
Anglo			
Reading	.72*	.43*	-.15
Math	.64*	.42*	.13
Black			
Reading	.64*	.57*	.36*
Math	.61*	.55*	.38*
Mexican American			
Reading	.64*	.50*	.18
Math	.59*	.46*	.12
Lower SES			
Reading	.64*	.58*	.39*
Math	.60*	.54*	.39*
Middle SES			
Reading	.63*	.40*	.09
Math	.58*	.38*	.10

*$p \leq .05$